



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
Exp. Date (11/30/2010)
Form No. (10-226)

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| Reporting Year: 2010 | Park: Shenandoah NP | Select the type of permit this report addresses: Scientific Study | |
| Name of principal investigator or responsible official: Martin Cipollini | | Office Phone: 706-290-2149 | |
| Mailing address: 430 Berry College Department of Biology Mount Berry, GA 30149 USA | | Office FAX 706-238-7855 Office Email mcipollini@berry.edu | |
| Additional investigators or key field assistants (first name, last name, office phone, office email) Name: Dennis Whigham Phone: (443) 482-2226 Email: whighamd@si.edu Name: Joshua Culberson Phone: 770-596-5621 Email: joshua.culberson@vikings.berry.edu | | | |
| Project Title (maximum 300 characters): Variation between the sexes in Linder benzoin | | | |
| Park-assigned Study or Activity #: SHEN-00371 | Park-assigned Permit #: SHEN-2010-SCI-0008 | Permit Start Date: Mar 25, 2010 | Permit Expiration Date: Aug 31, 2010 |
| Scientific Study Starting Date: Mar 25, 2010 | | Estimated Scientific Study Ending Date: Aug 31, 2010 | |
| For either a Scientific Study or a Science Education Activity, the status is: Completed | | For a Scientific Study that is completed, please check each of the following that applies: <input checked="" type="checkbox"/> A final report has been provided to the park or will be provided to the park within the next two years <input type="checkbox"/> Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park <input type="checkbox"/> All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed | |
| Activity Type: Research | | | |
| Subject/Discipline: Plant Communities (Vegetation) | | | |

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

The project that I am planning was developed with Dennis Whigham, John Parker, and Eric Lind (Smithsonian Environmental Research Center - SERC), and Josh Culberson (Berry College) and represents a follow-up to a study that I conducted in 1991-93, while I was a Smithsonian Institution Graduate Fellow. Joshua is a student at Berry College, and I (Martin Cipollini) am his advisor at Berry College and also serve as a Research Collaborator with the SERC Plant Ecology lab, Edgewater, MD. The project relates to an attempt to explain female-biased sex ratios in the dioecious woody shrub *Lindera benzoin* (Spicebush). Work done in the early 90's suggested that females may flower at an earlier age or smaller size (resulting in female-biased flowering sex ratios in young populations), but that the costs of females producing fruit may ultimately shift the population sex ratio toward more male-biased sex ratios as populations age. Comparisons of wild populations in MD, VA, WV, and PA (including a population at Shenandoah National Park) were suggestive of this pattern, and the anticipated sex-ratio shift was observed in dramatic fashion in a common garden at SERC where competition was forced by close, simultaneous planting of seedlings (most early flowerers were female, while nearly all

surviving flowerers were male by the end of the study). In an intensively studied wild population at SERC (Fox Point), plants observed to flower for the first time were predominantly female, yet females tended to flower less regularly than males, and may have differed from males in other ways as a result of their relatively greater costs of reproduction (e.g., differences in anti-herbivore defenses).

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

We mapped and temporarily marked a population of 50 flowering *Lindera benzoin* in early April 2010. We took measurements of basal stem diameters and took small mini-cores from the largest stem in each individual in June 2010. We then removed all ID tags and other marking materials. Samples were sanded and polished and used in a dendrochronological study to determine differences in age and growth rates of male vs female shrubs. These data are being incorporated into a manuscript in which males and females at various sites in MD, VA, WV and PA are compared.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

Yes

If "Yes", identify where the specimens currently are stored:

Mini core specimens are now in the lab of Troy Knight, St. Johns College, Collegeville, Minnesota.

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):

\$0

Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):

\$870

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.